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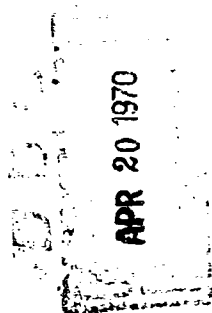
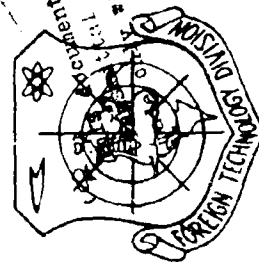
# FOREIGN TECHNOLOGY DIVISION



## STANDARDIZATION AND COMBATING ATMOSPHERIC AIR POLLUTION

by

Author Unknown



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## STANDARDIZATION AND COMBATTING ATMOSPHERIC AIR POLLUTION

Author Unknown

The danger of contaminated air for man has been known for many centuries now. As early as 2000 years ago Vitruvius warned against the settling of towns and villages close to swamps, the mephitic of which he thought contaminated the air and was dangerous to man.

The first efforts to protect the air against pollution began in the XIIIth century: in the year 1240 in Germany a decree was issued forbidding the wetting of flax and hemp close to human settlements because of the odors which are liberated in this process. In England in 1273 king Edward I issued a decree forbidding Londoners to use coal as a fuel because it filled the city with smoke.

Efforts to combat air pollution with the aid of dust-collecting devices started in the XVIIIth century. They did not gain widespread recognition because of the fact that air pollution was not then considered a threat.

During the last few decades the protection of air against pollutants has become a problem of great importance as a result of the rapid development of industry and transportation and the concentration of air pollution sources in industrial regions.

Considerable air pollution in certain industrial regions led to catastrophic results under certain atmospheric conditions (fog, windless weather). It is sufficient to recall here the catastrophe of

poisonous fog in 1930 in the Mosa valley, where 60 people succumbed to fatal poisoning; in 1948 in Donora (Pennsylvania) 20 people lost their lives from the same causes, and in 1952 in London 4000 people died. Deadly poisonings and very many lingering poisonings have also been noted in the Ruhr Valley area, in Los Angeles, Pittsburg and in other industrial regions.

Recognition of the sources and types of atmospheric pollutants and the amounts of dust, which are created by various industries and transportation and emitted into the atmosphere during one year, will allow the reader to evaluate the importance of the fight against air pollution in general, and in Poland especially. We will therefore mention in brief the industries and processes which are generally dust-creating:

Consumption of solid fuels is presently one of the most important contamination sources of atmospheric air. Large amounts of dusts and gases harmful to health are constantly being ejected by smoke stacks of industrial enterprises, electric-heating plants, boilers of municipalities and many other smaller and larger factories, and chimneys of residential housings heated with coal. The burning of coal produces, in addition to dust, carbon dioxide, carbon monoxide, sulfur dioxide, nitrogen oxide. According to the statistical manual for 1965, the number of these emissions carried off into the atmosphere amount to 2.8 million tons annually.

The building-materials industry, mainly cement factories, annually dumps 520 thousand tons of pollutants into the atmosphere. The metallurgy industry, in metallurgical processes and in the reprocessing and preparation of ores and fluxes - according to investigations of the Polish Academy of Sciences (PAN) carried out in the Upper-Silesian Industrial Region - in spite of the use of dust-collectors, dumps about 130 thousand tons of dusts and other chemical compounds into the air annually. Enormous amounts of dust are put into the atmosphere by the chemical industry, especially during the production of sodium and synthetic fertilizers, in which these dusts are very harmful not only to people, but also to vegetation, since they cause rapid destruction of crops and plants. The enormous growth in motorization and high

emission concentrations of mechanical vehicles in towns and industrial centers also contribute considerably to atmospheric pollution by combustion gases, the toxicity of which is known to everybody who remembers their use by the Hitlerites in murdering the people in extermination camps.

A calculated evaluation of the amounts of dust produced in Poland as a result of basic industrial processes, are estimated statistically at 500 kg annually per capita.

Contamination of atmospheric air has various, ever-harmful results. In addition to causing rapid fatal poisoning, about which we have already spoken, it causes delayed diseases which attack the mucuous membranes of the respiratory tracts (dust particles and various chemical substances). Older people suffering from emphysema, bronchial asthma and other illnesses of the respiratory system and of the heart with stoppage phenomena in the lungs are most susceptible to the lagging effects.

In such people poisonous air contaminations cause a deterioration in their state of health; there is also the possibility of a carcinogen effect, which after 30-40 years of lying dormant may cause a cancer, which is indicated by the frequent appearance of lung tumors among inhabitants of cities rather than of villages.

Air pollution often causes considerable economical losses.

The most palpable and easily evaluated losses are the direct material losses due to the emission of dust into the atmosphere. Depending upon the type of production and technological processes used material losses amount to 1 to 10% of production. The most significant are dusts emitted by the metallurgical industry, especially by foundries of nonferrous metals, cement factories, and electric power plants. In fact, the possibility of utilizing these dusts depends upon the development of economical methods of their retrieval and processing. Taking a very carefully average of the dusts emitted into the atmosphere, at 100 zloty per ton, the overall value of emitted dusts for the conditions of Poland equals 345 million zlotys.

Introduction on a broad scale of devices counteracting the admittance of dusts into the atmosphere not only cleans up the air, but also offers many economical advantages.

To produce the good dust-catching equipment the Polish Standards given below have been set up and confirmed by the Polish Committee on Standardization. Already now several prefabricated structural materials plants are working in Poland, directly utilizing the dusts obtained from dust-collecting devices of thermal power plants.

Air pollutants absorb and disperse the greater part of ultraviolet rays; this has the effect of increasing the number of bacteria in the air and slows down the growth of vegetation. An increase in the absorption of visible light causes an increase in the use of electric energy for the illumination of towns and developments. The losses originating from this reason in Leningrad are calculated at about 28% of the energy used.

Air pollution is also one of the major causes of fogs. The precipitation of dusts and condensed acids on the ground cause changes in the properties of the soil and reduces its yield considerably.

Further losses originating from contamination of the air are the greater use of machines and mechanisms, intensified corrosion of metals, and destruction of buildings and clothing. These losses in Poland are evaluated at a total of 14 to 17 billion zlotys per annum.

The constantly growing number and activity of air contamination sources in Poland has become such an important problem that it led to the establishment by the senate of the Polish People's Republic, on May 21, 1966, of Laws for Protecting Atmospheric Air against Pollution. The law defines the permissible concentrations of atmospheric air contamination, establishes methods of defining the permissible emission of contaminants and principles of setting up industrial plants. Great emphasis is placed on the system of measuring pollution and on controls. Permission for the setting up and activation of a new industrial plant depends upon the installation of effectively working dust-collector

devices, after prior analysis of the existing state of air pollution and the effect of the newly projected plant on the increase in pollution.

Investigations on the problems of protecting the air against pollution are being conducted by many organizations on an international scale, among them we have: Bureau International du Travail (International Work Bureau), l'Association Internationale de la Security Social (International Association for Social Security), l'Organisation Mondiale de la Sante (World Health Organization), and Commission Economique pour Europe (Economic Commission for Europe). Poland is taking part in the undertakings of these organizations.

On a national scale the scientific research and the scientific and technical works from this field are coordinated by the committee for sciences and technology. This operation is being conducted by the Main Commission for working conditions and Department of the protection of atmospheric air against pollution. A number of scientific institutions are also taking part in these operations: Central Institute of Labor Safety, Institute for Scientific Studies of the Office of Labor Safety of PAN, Main Mining Institute, Institute of Thermal Technique, Institute of Labor Medicine, Institute of Nonferrous Metals and certain faculties of higher technical institutions. Legal documents in form of the Polish Standards, pertaining to this problem, are established by the presidium of the Polish Committee of Standardization.

A careful plan of action for combatting air pollution is based on an exact knowledge of the agents which pollute atmospheric air and of their physical and chemical traits. This enables designers to develop dust-catching devices which are properly selected for the type of dusts created, and which are simultaneously the most effective and most economical. Such equipment not only obviates the threat to human life or health, but also considerably reduces material losses originating from air pollution and allows the retrieval of many raw materials which reach the atmosphere as a dust, thus saving many millions of zlotys.



Governed by these considerations, the Polish Standardization Committee set up a series of standards also pertaining to the investigation of dusts and establishment of their basic properties for the selection of the right dust-collecting equipment, as well as the characteristics of the dust-collecting equipment itself. The most essential standards should be mentioned:

- PN-64/Z-01001 Protection of atmospheric air against pollution.  
Dusts, pollution gas, antipollution devices. Names, definitions, symbols.
- PN-64/Z-01002 Characteristics of dry mechanical antipollution equipment.
- PN-64/Z-04000 Preparation of an average laboratory sample of dust particles.
- PN-65/Z-04002 Designation of the weight of an individual particle of emitted dust.
- PN-65/Z-04006 Designation of proper weight of a dust particle.
- PN-65/Z-04994 Designation of the angle of emission of dust.
- PN-66/Z-01003 Dust for examinations.
- PN-66/Z-04007 Analysis of rushes for dust above 63  $\mu\text{m}$  in size.
- PN-66/Z-04008 Analysis of dust granules less than 63  $\mu\text{m}$  in diameter.

Polish standards are based on domestic investigations and on the experience of highly industrialized countries, such as Great Britain, the USSR, USA, German Federal Republic, etc. Obviously the problems are far from exhausted. As the investigations continue their results will be published and new standards will be implemented.

A knowledge of the dangers of air pollution and of the concomitant additional multimillion-dollar losses in materials and the encouraging achievements of undertakings to prevent pollution of the atmosphere should mobilize broad circles of engineers and technicians designing industrial plants and supervising the operation of machines and industrial equipment, workers of the state sanitation inspector, technical labor inspectors, and laborers of the Industrial Safety and Hygiene services to still greater efforts for the total resolution of this problem.

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ABSTRACT (UNCL,0) ABSTRACT OF REPORT. This article discusses the dangers of air pollution, its primary causes and the major pollution contributors, and the efforts made to combat air pollution in Poland. Also mentioned are the economic losses resulting from the emission of usable dusts into the atmosphere and their possible retrieval. The norms which are adopted for air pollution in Poland are based on those of highly industrialized countries and on investigations in Poland.				